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A Review of Nearctic *Lispe* Latreille (Diptera, Muscidae)

By Fred M. Snyder[1]

Attempts to identify certain specimens of Nearctic *Lispe* in existing keys indicated that several previously undescribed species were involved. Consequently a study was made of male and female terminalia to determine their usefulness in the definition of specific limits. These organs were found to be valuable for this purpose in certain species groups but were of little value in others. However, differences or similarities in their general configuration indicate that three species groups are present in the genus, and these genitalic characters are associated with the shape of the palpi and the presence or absence of certain tibial bristles, characters easily seen in undissected specimens.

This paper is presented to facilitate identification of the new species and to illustrate the terminalia of the Nearctic forms. It is suggested that if similar correlations of the terminalia and structural characters are found in species from other faunal regions, such characters may be useful for generic or subgeneric division of the genus.

Adults may be of some economic importance in reducing mosquito populations, since they have been observed by Lamborn (1920, p. 279) and Cuthbertson (1937, p. 23) to capture larvae, pupae, and adults of several species of mosquitoes in Africa. This habit was confirmed by personal observation of several African species, but similar habits of Nearctic or Neotropical species have not been recorded, as far as I know, although a few specimens have been collected which still held various Nematocera adults which were apparently their prey.

Specimens are usually found near the margin of standing or running water, particularly in a sunny situation. The larvae of at least some species appear to be aquatic (Séguy, 1923, p. 186; Johannsen, 1935, p. 42). Adults are occasionally seen near carrion, or feces, especially if near

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water, and have also been taken in blow-fly traps, sweeping in grass, and even along dusty roads, but collections made at near-by semi-permanent or permanent bodies of water will usually yield them in greater numbers.

Descriptions or redescriptions of most Nearctic species will be found in Aldrich's (1913) paper, so remarks are here limited to discussions of differences or similarities of the several species. Detailed time and locality data for the more common species are omitted. Except for the almost cosmopolitan *tentaculata* deGeer, the states in which the specimens were collected are noted.

It is with pleasure that grateful acknowledgement is made to the following entomologists and institutions for their kindness and help in making material of this genus available for study: Drs. C. P. Alexander and M. E. Smith of Massachusetts State College; C. L. Fluke, University of Wisconsin; M. T. James, State College of Washington; G. F. Knowlton, Utah Agricultural Experiment Station; E. H. Strickland, University of Alberta, and G. E. Shewell of the Canadian National Collection, Ottawa. I am also very grateful to Dr. H. C. Huckett of Riverhead, New York, for the opportunity to study his personal collection of this genus, as well as to Mr. P. J. Arnaud of Redwood City, California, for the opportunity to examine specimens collected by him. To Drs. C. W. Sabrosky and J. Bequaert, I am especially grateful for their kindness and the privilege of studying types as well as other material in the collections of the United States National Museum and the Museum of Comparative Zoölogy at Harvard College, respectively. Mr. J. E. Collin of Newmarket, Suffolk, and Dr. F. van Emden of the Commonwealth Institute of Entomology made several European species available for study and comparison. To Dr. W. Hennig of the Deutsches Entomologisches Institut, thanks are due for kindness in supplying notes on what is presumed to be the type of *L. bohemica* Becker in the Zoological Museum of the University of Berlin. Dr. C. H. Curran of the American Museum of Natural History was most helpful in supplying the collection of this institution for study, and I am grateful to him for other help.

Unless otherwise stated, holotypes of the new species are deposited in the American Museum of Natural History. In so far as possible, paratypes of other new species will be deposited there and in the United States National Museum.

Characters Used

The presence or absence of hairs on various portions of the hypopleura is of generic or specific importance in most Muscidae. This part is actually composed of several distinct sclerites, the homologies of which are not

well understood. In this paper the term "beret" (van Emden, 1941, p. 252) is used for that portion of the hypopleura which is just anterior to the fore corner of the metathoracic spiracle. There is a small sclerite (actually two can be distinguished in some species and genera) which adjoins the base of the hind coxae and is situated immediately posterior to the large central portion of the hypopleura. It is somewhat subtriangular in shape, and in previous papers I have referred to this part with the rather cumbersome phrase "subtriangular portion of hypopleura above hind coxae." Ferris (1950, p. 399) has used the term "pre-episternum 3" for this part of the hypopleura, and for brevity that name is used in this paper, although it is recognized that it is a strictly morphological and not a taxonomic term. Unless otherwise qualified, the phrase "hypopleura hairy" refers to the presence of short hairs on that portion of the hypopleura which is below (ventrad to) the metathoracic spiracle.

In many species there is a dark band extending transversely from the base of each antenna to the margin of the compound eye which is seen best when the head is viewed from in front. When this band is very prominent, e.g., as in *palposa* Walker, the mark extends dorsally and/or posteriorly from the base of the antennae onto the anterior portion of the parafrontals and ventrally onto the upper or dorsal portion of the parafacials. In some species, e.g., *salina* Aldrich, the darkest area is the anterior portion of the parafrontals, while in other species, e.g., *canadensis,* new species, the darkened area is most distinct on the upper portion of the parafacials. Instead of the long, but more exact phrase, "transverse band adjacent the parafacials and/or parafrontals," "transverse band" is used for this dark area.

Aldrich has pointed out the usefulness of a quotient obtained when the narrowest *measured* distance separating the eyes is divided by the greatest *measured* head width. The narrowest distance between the eyes is slightly below (ventrad to) the base of the antennae, and therefore such quotients or ratios hereafter are referred to as "face/head ratio." These figures are useful in some cases for separating closely allied species, but identification based primarily upon them are time-consuming, and it has been found from personal experience that different quotients are frequently obtained depending upon the observer, ocular-measuring equipment, or slight differences in the angle at which a specimen is held when these particular measurements are made. Because of the lateral curvature of the compound eyes, and the subsequent difficulty of aligning the exact edge of the head with a particular line on the micrometer, it is frequently difficult to be sure where to begin the measurement of maximum head width. In addition, specimens which are still somewhat teneral, but other-

wise exhibit most diagnostic characters, have quotients which are at considerable variance with those of more mature specimens. Such quotients are omitted from consideration in the present studies. Despite the difficulties, such ratios are useful to separate females of some very closely allied species, and these ratios were used as key characters only when they appeared to offer the only means of separating or uniting allied forms with few or no other tangible structural or color characters.

Many measurements were made in the course of this study and, as would be expected from the larger number studied, the range (lowest to highest individual quotients) was found to be somewhat larger than that indicated by Aldrich. Nonetheless, when these characters were used for separating species the means were found by statistical analysis (t test) to be significant at or beyond the 0.01 level.

Table 1 illustrates variations in the ratios observed in the four species where these quotients were used as key characters (couplets 25 and 26). In nearly all cases, the highest individual quotient of a species with a low mean ratio was less than the lowest individual quotient of a species having a higher mean ratio.

TABLE 1

DATA ON FACE/HEAD RATIOS OF FEMALES OF FIVE SPECIES OF *Lispe*

	Mean Face/Head Ratio	Standard Deviation	Number Measured (N)	Range
salina	0.474	0.0204	28	0.431–0.519
jamesi	0.451	0.0086	8	0.434–0.460
brevipes	0.399	0.0094	6	0.384–0.415
probohemica and *argentea*	0.352	0.0188	9	0.333–0.388

Illustrations were prepared by means of an ocular grid and squared paper. All portions of the terminalia of both sexes except in figure 52 were drawn to the same scale. The superior forceps are usually seen readily in pinned specimens, and the illustrations of these parts were drawn from such material. The remaining portions of the terminalia were figured from relaxed and dissected specimens which were allowed to remain overnight in 10 per cent potassium hydroxide, then washed in tap water and preserved in glycerine. The inferior forceps were not drawn, since they offer few specific differences and their inclusion in the illustrations would obliterate more tangible ones to be seen in the fulcrum penis. The characteristic median basal plate of the fifth abdominal sternite of the

uliginosa-group was not figured except in the case of *albitarsis,* since it is usually at a 45-degree angle to the lateral processes and therefore several drawings would be necessary. The lateral processes appear to offer more specific differences than does the basal plate. In the remaining figures different scales of magnification were used. However, pairs of figures used to illustrate comparative structures in closely allied species were drawn to the same scale, e.g., figures 1 and 2 to one scale, and figures 7 to 14 to another.

GENUS *LISPE* LATREILLE

Lispe LATREILLE, 1796, Précis des caractères génériques des insectes, p. 169. COQUILLETT, 1901, Jour. New York Ent. Soc., vol. 9, pp. 138, 144; 1910, Proc. U. S. Natl. Mus., vol. 37, p. 562. CURRAN, 1937, Amer. Mus. Novitates, no. 931, p. 1. VAN EMDEN, 1941, Bull. Ent. Res., vol. 32, p. 268. SNYDER, 1949, Amer. Mus. Novitates, no. 1403, p. 1.

Lispa KOWARZ, 1892, Wiener Ent. Zeitg., vol. 11, p. 33. PANDELLÉ, 1899, Rev. d'Ent., for 1898, p. 132. BECKER, 1904, Zeitschr. Ent., Breslau, vol. 29, p. 1. SCHNABL AND DZIEDZICKI, 1911, Nova Acta Abhandl. Leopoldinisch-Carolinischen Deutschen Akad. Naturf., vol. 95, p. 143. ALDRICH, 1913, Jour. New York Ent. Soc., vol. 21, p. 127. MALLOCH, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 279; 1922, *ibid.*, ser. 9, vol. 10, p. 391; 1934, Diptera of Patagonia and south Chile, pt. 7, fasc. 2, p. 278. SÉGUY, 1923, Faune de France, Diptères anthomyides, vol. 6, p. 186; 1937, *in* Wytsman, Genera insectorum, fasc. 205, p. 181. KARL, 1928, Die Tierwelt Deutschlands, pt. 13, Diptera: Muscidae, vol. 3, p. 106.

GENOTYPE: *Musca tentaculata* deGeer.

Lispe is one of the more easily recognized genera of Nearctic Muscidae and can be readily distinguished by the rather large apically dilated palpi (figs. 3–6) and setulose pteropleura. Aldrich (1913) has given an excellent enumeration of the various characters common to all species, and it need only be added that most Nearctic species possess one or more hairs on pre-episternum 3.

Certain characters of the terminalia enumerated below for both sexes appear to segregate the Nearctic species of *Lispe* into three distinct groups, and the presence or absence of certain bristles on the tibiae appears to be somewhat correlated with these genitalic characters. However, until more species from other faunal regions, especially the Australian and Oriental ones, can be examined, no new generic or infra-generic names are proposed for these segregates, although it is believed that certain natural relationships or evolutionary lines of development are indicated by them.

It might be noted at this time that the Neotropical and African species which have been available for study do not deviate too greatly from the following groups.

Lispe tentaculata Group (*Lispe*, Sensu Stricto)

Both Sexes: Apical anterodorsal bristle on hind tibiae absent, or, if somewhat differentiated, then not so long as the diameter of tibiae where situated; mid tibiae without a submedian anterodorsal bristle; abdomen somewhat flattened, dark, and with a series of distinct white basolateral spots on the second to fourth visible tergites, and a smaller median one at apex of second to fourth. Margins of palpi abruptly divergent (figs. 3, 4).

Male Terminalia: Superior forceps apparently fused and with an inverted U- to V-shaped incision on each side (fig. 21); fifth sternite with a median, anteriorly directed process in addition to the short and apically semi-membranous lateral processes (fig. 36). Penis very long, narrow, and non-membranous. Fulcrum penis comparatively simple but with a long, slender posterior accessory structure (fig. 53).

Female Terminalia: Eighth and ninth tergites not completely fused, the dorsal portion of the tenth closely associated with the ninth and the former with only short, indistinct, dorsal setulae on each side (fig. 67).

The three Nearctic species of this group, *L. tentaculata* deGeer, *sociabilis* Loew, and *patellata* Aldrich have, in so far as I have been able to determine, identical genital characters, and these structures are therefore of little value in separating the species from one another. The males are readily distinguished by the shape of the fore metatarsus (figs. 9–14) and palpi. Females are very difficult to separate from one another.

Lispe uliginosa Group

Both Sexes: Hind tibiae with the apical anterodorsal and submedian anteroventral bristle well developed. Fore tibiae with a submedian anterodorsal bristle. Mid tibiae with a well-developed median anterodorsal bristle. Margins of palpi very gradually divergent (fig. 6). Abdomen subcylindrical and variably marked.

Male Terminalia: Superior forceps more or less completely separated along their entire length (figs. 22–29). The fifth sternite is separated into three rather distinct parts, a median or basal plate or cup, and with a distinct lateral process on each side (figs. 37–44). Penis mostly semi-membranous (figs. 54–58), accessory portions of fulcrum penis moderately short and broad.

Female Terminalia: Eighth tergite continued downward almost to ventral surface and broader here than above. Tenth tergite with a single very long bristle on each side of the mid line (figs. 68–70).

The Nearctic species comprising this group are: *L. albitarsis* Stein, *nasoni* Stein, *cotidiana*, new species, *neouliginosa*, new species, *antennata*

Aldrich, *polita* Coquillett, and *nudifacies,* new species. The European species *L. uliginosa* Fallén belongs here.

The superior forceps and the processes of the fifth sternite of the males in all the above species exhibit small but distinct differences. However, the fulcrum penis and associated parts appear identical in *cotidiana* and *uliginosa* and are also identical in *antennata, nudifacies,* and *polita.* On the basis of the penis and associated portions of the fulcrum, it will thus be seen that there are five main types, as illustrated by *albitarsis, cotidiana, antennata, neouliginosa,* and *nasoni* (figs. 54–58).

Terminalia of the females offer few specific characters, and in the entire series of species only three rather ill-defined types, as illustrated by figures 68 to 70, are to be seen. Except for *nasoni* and *albitarsis,* ovipositors of the other species in the *uliginosa* group appear to be identical with the ovipositor illustrated for *cotidiana.*

Lispe palposa Group

Both Sexes: Hind tibiae with a distinct apical anterodorsal bristle, without a submedian anteroventral bristle; fore tibiae without a submedian anterodorsal bristle. Margins of palpi less abruptly divergent (fig. 5) than in the *tentaculata* group, but somewhat more divergent than in the *uliginosa* group. Abdominal shape and coloring somewhat variable, but the males of Nearctic species always with a dorsal, median white spot on the large, apical, velvety black, hypopygial segment.

Male Terminalia: Superior forceps closely associated mesally along most of their length, but not fused, the apices rather slender and pointed (figs. 30–35). Fifth sternite in one piece and either with a shallow median incision or almost transverse apically (figs. 45–51). Penis chitinous in part along posterior or ventral border. Accessory portions of the fulcrum penis usually with elongate hook-like structures (figs. 59–66).

Female Terminalia: Eighth tergite quite reduced, the tenth with two or more elongated dorsal bristles on each side, and frequently with several distinct accessory setulae (figs. 71–77).

The North American species in this group are: *sordida* Aldrich, *probohemica* Speiser, *salina* Aldrich, *palposa* Walker, *johnsoni* Aldrich, *bohemica* Becker, *brevipes* Aldrich, *jamesi,* new species, and *canadensis,* new species. The male terminalia of all species except *johnsoni* Aldrich and *bohemica* Becker were examined, and at least one or more portions of the fulcrum penis exhibit distinct differences; smaller differences are also found in the shape and bristling of the fifth sternite and superior forceps. Female ovipositors of all species examined within the group also exhibit slight, but distinct, specific differences.

KEY TO NEARCTIC *Lispe*

1. Mid tibiae without a submedian anterodorsal bristle. *Males*: Superior forceps with an apical incision (fig. 21); fifth abdominal sternite with a median projection (fig. 36). *Females*: The apical anterodorsal bristle on hind tibiae absent, or, if present and hair-like, then considerably shorter than tibial diameter 27

   Mid tibiae with a submedian anterodorsal bristle. *Males*: Superior forceps pointed at apex (figs. 22–35); fifth abdominal sternite without a median projection (figs. 37–51). *Females*: Apical anterodorsal bristle on hind tibiae well differentiated and as long as, or distinctly longer than, tibial diameter 2

2. *Males*: Second mid tarsal segment considerably shorter than the third. *Females*: Mid tibiae with two submedian posterodorsal bristles and the fore tibiae with a median posterior bristle[1] . . . . . *sordida* Aldrich

   Males: Second mid tarsal segment as long as, or longer than, the third. *Females*: Mid tibiae with a single submedian posterior to posterodorsal bristle[1] 3

3. Hind tibiae without a submedian anteroventral bristle; fore tibiae without a submedian anterodorsal bristle; palpi somewhat abruptly dilated on the apical portion (fig. 5). *Males*: With a prominent median dorsal white spot on the large, black apical hypopygial segment 11

   Hind tibiae with a submedian anteroventral bristle; fore tibiae with a submedian anterodorsal bristle; palpi gradually enlarged from base to apex (fig. 6). *Males:* Without a prominent spot on hypopygial segment 4

4. Mid tibiae with a submedian anteroventral to ventral bristle 5

   Mid tibiae without a submedian anteroventral to ventral bristle . . . 6

5. Femora and tibiae dark brown to black, concolorous; abdomen largely dark and subshiny, without well-defined markings . *polita* Coquillett

   Femora and tibiae not concolorous, the former black, the tibiae fulvous; abdomen with distinct paired spots on at least the second and third third visible tergites . . . . . *cotidiana*, new species

6. Mid femora with a conspicuous median anterior and anteroventral bristle, and both are at least as long as greatest diameter of femora. *Males*: Three basal fore tarsal segments slender, mostly yellow, the fourth and fifth segments distinctly broadened and infuscated; small species, usually not over 5.5 mm. long . . . . . *albitarsis* Stein

   Mid femora without a conspicuous anterior and anteroventral median bristle at the same time. *Males*: Fore tarsal segments of almost uniform width; larger species, usually 6.0 to 8.0 mm. long 7

7. Four pairs of postsutural dorsocentral bristles, the anterior two pairs short and not over 0.6 as long as the posterior pair. *Males*: Superior forceps with several long, somewhat curled hairs near apex on inner surface (fig. 29) . . . . . *nasoni* Stein

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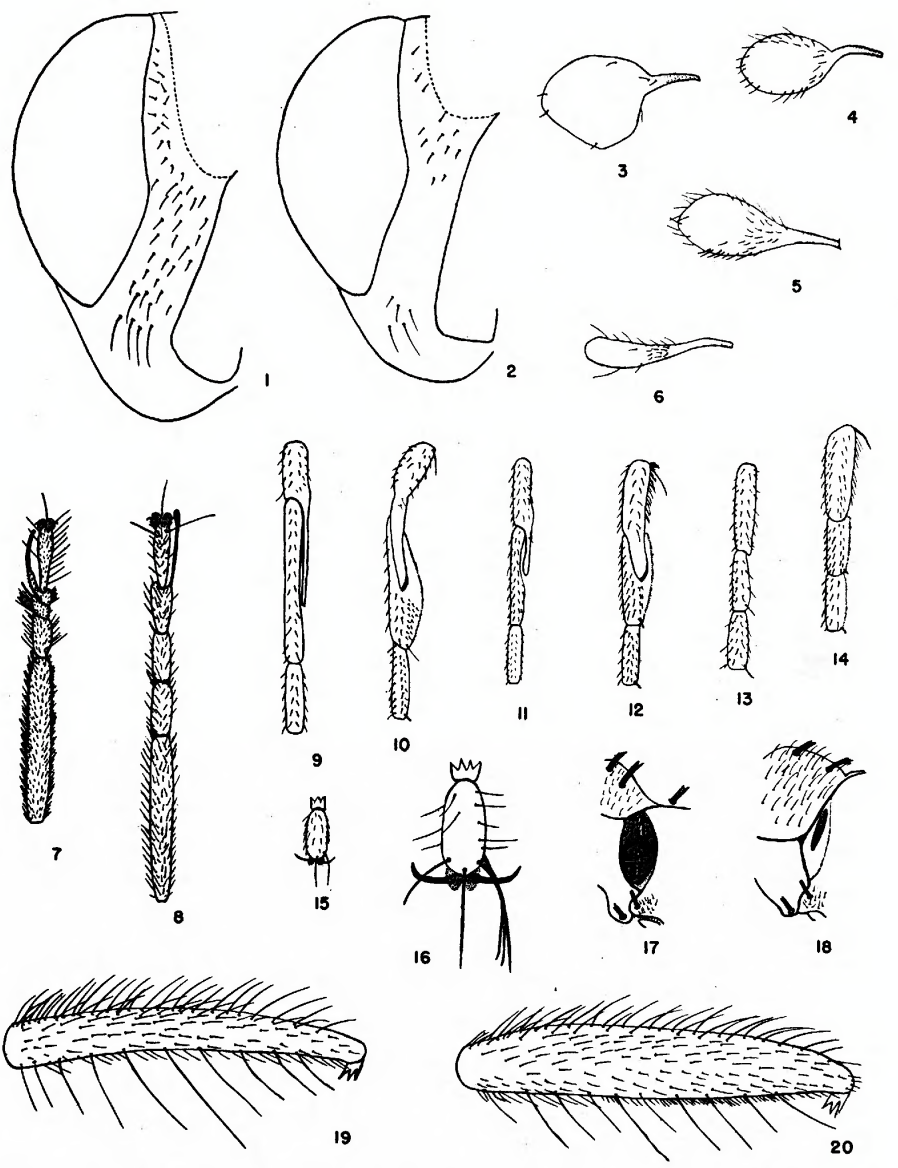
[1] A few specimens of *canadensis*, new species, have two submedian posterodorsal bristles on the mid tibiae, but all specimens lack the posterior bristle on the fore tibiae and the thoracic and abdominal spiracles are considerably larger in *canadensis* than in *sordida*.



FIGS. 1–2. Parafacial and parafrontal of male. 1. *Lispe antennata*. 2. *L. nudifacies*.
FIGS. 3–6. Palpi. 3. *L. patellata* (male). 4. *L. tentaculata* (female). 5. *L. sordida* (female). 6. *L. nasoni* (female).
FIGS. 7–8. Left mid tarsus of male (dorsal surface). 7. *L. probohemica*. 8. *L. bohemica*.
FIGS. 9–14. Basal three tarsal segments of male. 9. *L. tentaculata* (dorsal surface). 10. *L. tentaculata* (posterior surface). 11. *L. patellata* (dorsal surface). 12. *L. patellata* (posterior surface). 13. *L. sociabilis* (dorsal surface). 14. *L. sociabilis* (posterior surface).
FIGS. 15–16. Fifth hind tarsal segment of male (dorsal surface). 15. *L. brevipes*. 16. *L. jamesi*.
FIGS. 17–18. Mesothoracic spiracle of female. 17. *L. canadensis*. 18. *L. johnsoni*.
FIGS. 19–20. Anterior view of hind femora of female. 19. *L. canadensis*. 20. *L. johnsoni*.

Three pairs of postsutural dorsocentral bristles which become gradually longer posteriorly, but if occasional specimens have four pairs, then they are all subequal in length. *Males*: Superior forceps without long, curly hairs near apex on inner surface 8

8. Tarsi concolorous with tibiae, or fulvous on at least the basal three segments 9

Tarsi not concolorous with tibiae, all segments dark brown to black and contrasting with the fulvous-colored tibiae 10

9. *Males*: Parafacials setulose along their entire length (fig. 1). *Females*: Abdominal tergites without distinct paired dorsal marks; apical one-third to one-half of fore tibiae with dense bluish gray pruinescence that makes this portion of the tibiae appear almost infuscated when viewed at certain angles (Nevada) . . . . . *antennata* Aldrich

Males: Middle of parafacials bare (fig. 2). *Females*: Abdomen with distinct paired dark spots on second and third visible tergites; fore tibiae appears fulvous at all angles (eastern and middle western United States and southern Canada) . . . . . *nudifacies*, new species

10. *Males*: Fore tibiae with a distinct apical anteroventral to ventral bristle. *Females*: Hind femora without a short but distinct anteroventral bristle near apex (Palearctic species) . . . . . *uliginosa* Fallén

Males: Fore tibiae without a distinct apical anteroventral to ventral bristle. *Females*: With a short but distinct apical anteroventral bristle near apex which is usually as long as diameter of hind femora where situated (western United States) . . . . . *neouliginosa*, new species

11. Males 12

Females 20

12. Fourth mid tarsal segment with an apical spine-like projection which is subequal to length of the fifth segment 13

Fourth mid tarsal segment without an apical spine-like projection . . . 15

13. Palpi black to dark brown; spine on fourth tarsal segment situated anteriorly (fig. 8) . . . . . *bohemica* Becker

Palpi yellow; spine on fourth tarsal segment situated posteriorly (fig. 7) . 14

14. Vibrissae either very short and delicate or not differentiated . . . . . *probohemica* Speiser

Vibrissae well developed and prominent . . . . . *argentea*, new species

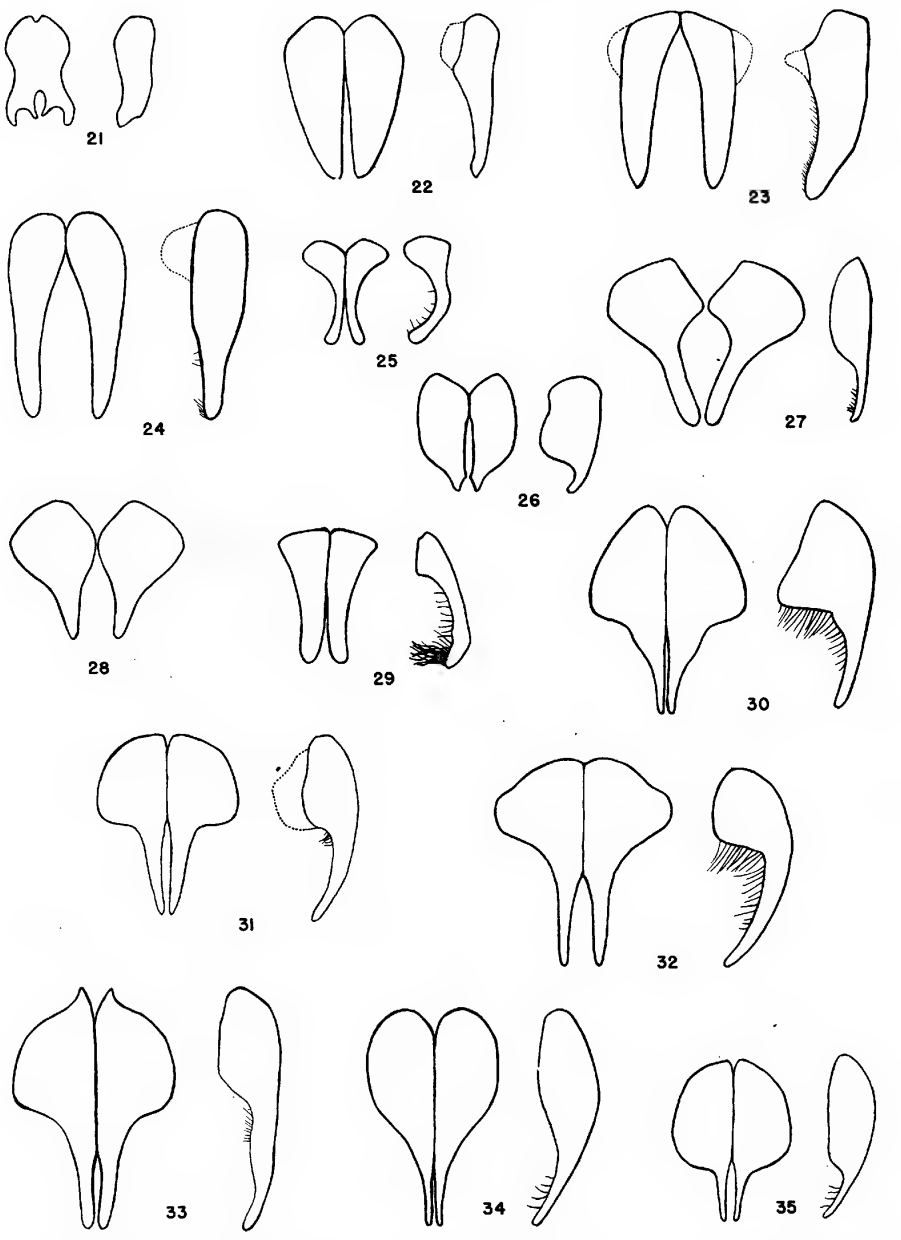
15. Vibrissae strong and prominent, at least 1.5 times as long as greatest width of palpi 16

Vibrissae absent or, if hair-like, then scarcely as long as greatest width of palpi 18

16. Hind femora with numerous long posteroventral bristles on the basal half which are almost or quite twice as long as the diameter of femora where situated; fifth abdominal tergite with a fringe of long hairs and bristles and when viewed in profile the lateral hairs extend to beyond apex of hypopygium (fig. 52) . . . . . *salina* Aldrich

Hind femora with at most a few short posteroventral hairs which are scarcely as long as femoral diameter; fifth abdominal sternite without a fringe of long hairs and bristles, and when viewed in profile none extend to apex of hypopygium 17

17. Mesothoracic spiracle very prominent (fig. 17) (northern Canada) . . . . . *canadensis*, new species



FIGS. 21–35. Dorsal (caudal) and lateral views of superior forceps (dorsal on left, lateral on right). 21. *Lispe sociabilis*. 22. *L. neouliginosa*. 23. *L. cotidiana*. 24. *L. uliginosa*. 25. *L. albitarsis*. 26. *L. polita*. 27. *L. nudifacies*. 28. *L. antennata* (dorsum only). 29. *L. nasoni*. 30. *L. jamesi*. 31. *L. palposa*. 32. *L. brevipes*. 33. *L. salina*. 34. *L. sordida*. 35. *L. argentea*.

Mesothoracic spiracle small (fig. 18) (New York and Massachusetts) . . . . . *johnsoni* Aldrich

18. Palpi black. In profile the transverse band very broad and prominent . . . . . *palposa* (Walker)
Palpi yellow to light brown. In profile transverse band narrow and not unusually prominent 19

19. Fifth hind tarsal segment large, with two or three long, prominent, subapical, posterior hairs (fig. 16); face/head ratio 0.36 to 0.40 . . . . . *jamesi*, new species
Fifth hind tarsal segment small, with one or two fine subapical posterior hairs (fig. 15); face/head ratio 0.32 to 0.35 . . . . . *brevipes* Aldrich

20. Palpi black 21
Palpi yellow to brown 22

21. Transverse band in profile extending ventrally to opposite or below the middle of the second antennal segment . . . . . *palposa* (Walker)
Transverse band in profile not extending below anterior parafrontal bristle . . . . . *bohemica* Becker

22. Hind femora with the anteroventral bristles on the basal third longer than the diameter of femora where situated (figs. 19, 20) 23
Hind femora without anteroventral bristles on basal half, or, if a few distinct hairs are present, they are considerably shorter than femoral diameter . 24

23. Mesothoracic spiracle conspicuously enlarged (fig. 17) . . . . . *canadensis*, new species
Mesothoracic spiracle small (fig. 18) . . . . . *johnsoni* Aldrich

24. Transverse band in frontal view prominent, the lower margin extending to opposite or below the dorsal third of second antennal segment 25
Transverse band in frontal view absent or the dark mark on the anterior portion of parafrontals does not extend ventrad to the juncture of parafacials and parafrontals 26

25. Head/face ratio 0.43 or more . . . . . *jamesi*, new species
Head/face ratio less than 0.42 . . . . . *brevipes* Aldrich

26. Head/face ratio 0.43 or more . . . . . *salina* Aldrich
Head/face ratio not over 0.39 . *probohemica* Speiser and *argentea*, new species

27. Males 28
Females 30

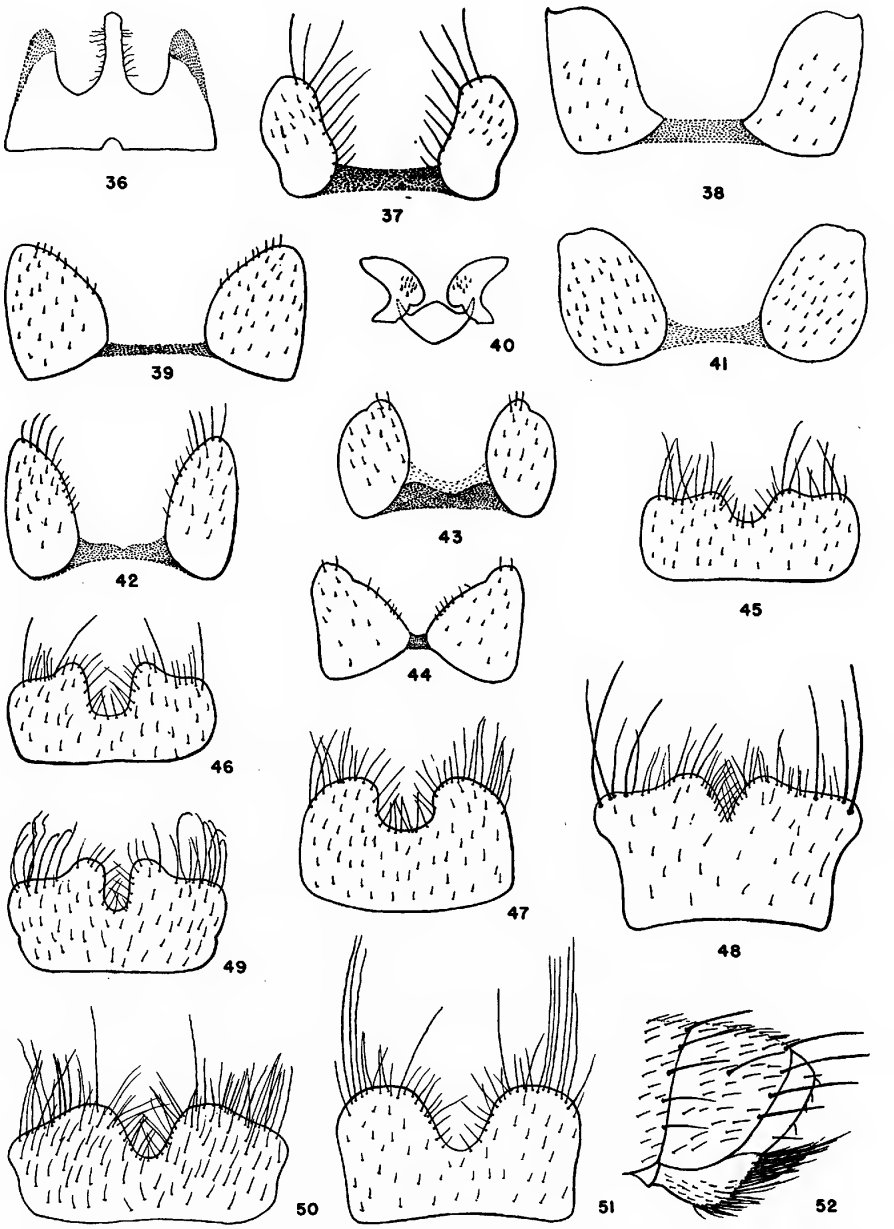
28. Fore metatarsus with a prominent posterior apical prolongation . . . 29
Fore metatarsus without a prominent posterior apical prolongation (figs. 13, 14) . . . . . *sociabilis* Loew

29. Fore metatarsal prolongation not so long as the basal portion of the segment (figs. 11, 12) . . . . . *patellata* Aldrich
Fore metatarsal prolongation considerably longer than basal portion of the segment (figs. 9, 10) . . . . . *tentaculata* (deGeer)

30. Tibiae mostly fulvous . . . . . *tentaculata* (deGeer)
Tibiae mostly infuscated 31

31. Hind femora with two, and frequently more, distinct submedian anteroventral bristles . . . . . *tentaculata* (deGeer)
Hind femora without, or at most with one or two, submedian anteroventral bristles 32

32. Eastern species; submedian posterodorsal bristle on hind tibiae usually distinct . . . . . *sociabilis* Loew



FIGS. 36–51. Fifth abdominal sternite of male. 36. *Lispe sociabilis*. 37. *L. nasoni*. 38. *L. nudifacies*. 39. *L. uliginosa*. 40. *L. albitarsis*. 41. *L. antennata*. 42. *L. cotidiana*. 43. *L. polita*. 44. *L. neouliginosa*. 45. *L. argentea*. 46. *L. probohemica*. 47. *L. canadensis*. 48. *L. sordida*. 49. *L. palposa*. 50. *L. brevipes*. 51. *L. jamesi*.

FIG. 52. Lateral view of apex of abdomen of *L. salina*.

Western species; submedian posterodorsal bristle on hind tibiae usually indistinct . . . . . *patellata* Aldrich

Lispe albitarsis Stein

Figures 25, 40, 54, 68

Lispa albitarsis Stein, 1897, Berliner Ent. Zeitschr., vol. 42, pp. 277, 288. Aldrich, 1913, Jour. New York Ent. Soc., vol. 21, p. 141.

Males of this small species are easily recognized by the shape and coloring of the fore tarsi, as noted in the key. They can be distinguished also by the very narrow parafacials (in frontal view) which at their narrowest part are not over twice as wide as the greatest aristal diameter. The face/head ratio, 0.284 to 0.325, is less than in any other Nearctic species. The eye facets are distinctly enlarged where the eyes are most nearly approximated. The hind femora have a long slender ventral to posteroventral basal bristle that is usually 0.5 to 0.66 as long as the femoral length. Several long, conspicuous ventral bristles are also present near the base of the hind femora.

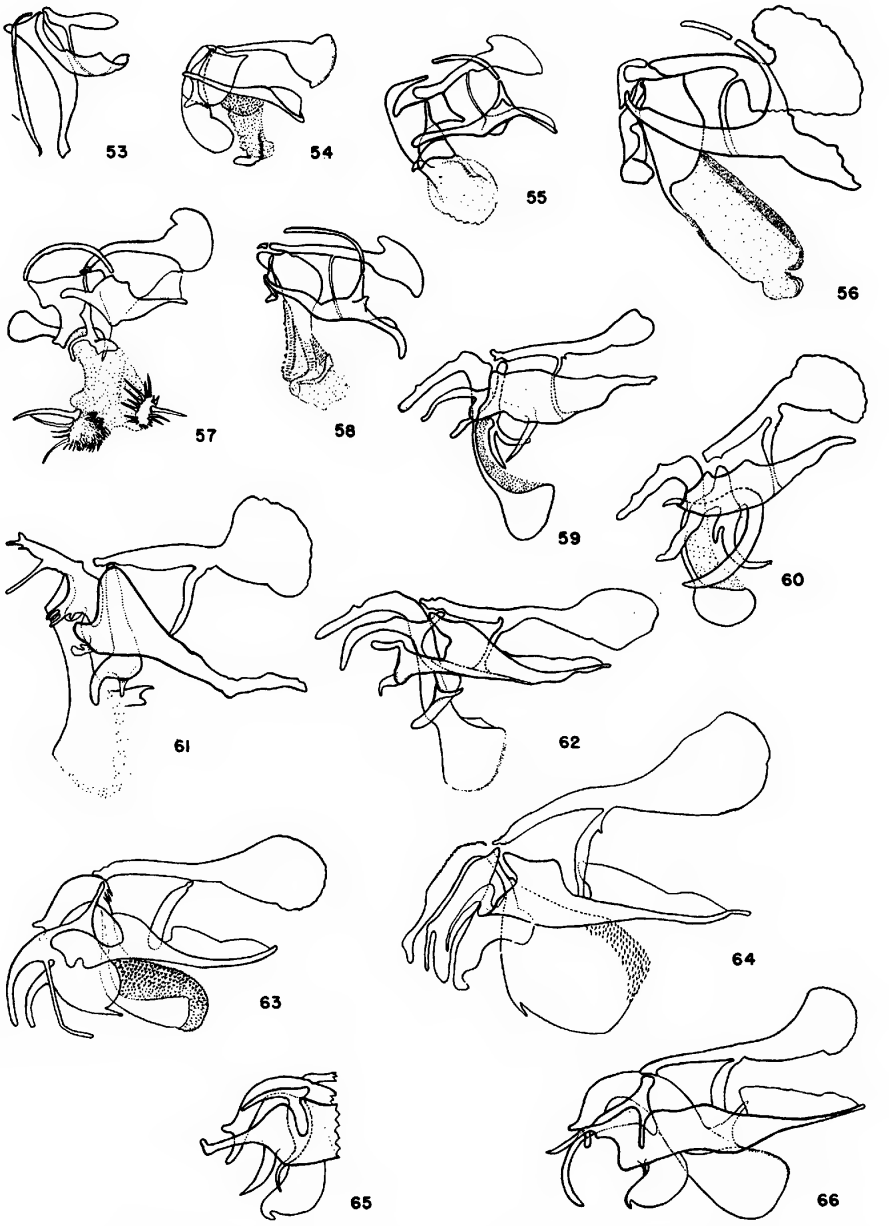
The females do not have modified fore tarsi or enlarged eye facets, and the parafacials are considerably broader; the face/head ratio is 0.357 to 0.397. The most satisfactory character for distinguishing females of this species from those of closely allied ones is the presence of a strong, and usually isolated, submedian anterior bristle on the mid femora and a similar anteroventral to ventral one, but occasional specimens of this species may have one or two shorter and weaker bristles basad to the prominent anterior bristle. The hind femora have a ventral to posteroventral bristle which is considerably shorter than in the male.

Unlike most species of Nearctic *Lispe,* both sexes lack setulae on pre-episternum 3.

The Neotropical species *serotina* van der Wulp[1] superficially resembles this species in its small size, bare pre-episternum 3, and similarly marked abdomen. It may possibly occur in the southern portion of the Nearctic region, although no specimens have been seen north of Mexico (Veracruz and Ixtepec) or Puerto Rico.

Lispe serotina has four postsutural dorsocentral bristles, similar to those in *nasoni* Stein, but the males have the fore tarsi uniformly infuscated. The females have a prominent median anterior bristle on the mid femora but lack the anteroventral to ventral one which is so characteristic of *albitarsis*. Females of *serotina* also have an extensive area on the apical third or more of the hind femora which is entirely devoid of clothing setulae; and the mesonotum has three broad, dark, longitudinal stripes,

[1] See notes under *cotidiana*, new species.



FIGS. 53–66. Lateral view of fulcrum penis and associated parts (interior forceps omitted). 53. *Lispe sociabilis*. 54. *L. albitarsis*. 55. *L. cotidiana*. 56. *L. antennata*. 57. *L. nasoni*. 58. *L. neouliginosa*. 59. *L. probohemica*. 60. *L. argentea*. 61. *L. sordida*. 62. *L. canadensis*. 63. *L. palposa*. 64. *L. salina*. 65. *L. brevipes*. 66. *L. jamesi*.

one along each plane of the dorsocentral bristles and a median one which extends to the apex of scutellum. In *albitarsis* the apical third of the hind femora is uniformly covered with clothing setulae, and there are five dorsocentral stripes, the additional ones lying laterad to the dorsocentral row of bristles.

DISTRIBUTION: Somewhat over 300 specimens of both sexes were examined from Connecticut, Florida, Georgia, Illinois, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, New Brunswick, New Hampshire, New Jersey, New York, Ontario, Pennsylvania, Wisconsin, and Quebec. This appears to be the commonest species of *Lispe* in Florida.

Lispe nasoni Stein

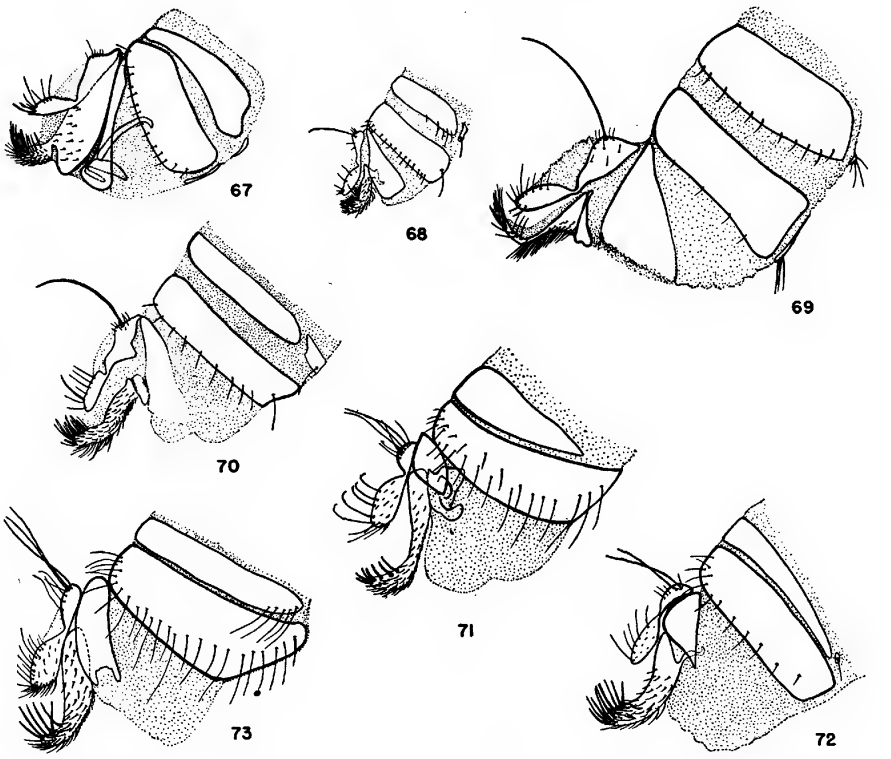
Figures 6, 29, 37, 57, 70

Lispa nasoni STEIN, 1897, Berliner Ent. Zeitschr., vol. 42, p. 280. ALDRICH, 1913, Jour. New York, Ent. Soc., vol. 21, p. 142.

The number, size, and arrangement of the postsutural dorsocentral bristles, as indicated in the key, should readily distinguish this species from other *Lispe* occurring in the Nearctic region. The males can be distinguished readily by the distinct configuration of the superior forceps and penis.

Female specimens which are badly rubbed or pinned so as to obscure the dorsocentral arrangement are difficult to distinguish from certain species in the *uliginosa* group, although the different coloring of the tarsi in *antennata* and *nudifacies* and the presence of a submedian anteroventral to ventral bristle on the mid tibiae of *polita* and *cotidiana* should readily distinguish them, and the presence of hairs on pre-episternum 3 separates it from *albitarsis*. It is not easily distinguished from *neouliginosa* if the dorsocentrals are obscured. In such specimens, the most useful distinguishing characters appear to be the size and arrangement of the apical bristles on the hind tibiae. In *nasoni*, the apical dorsal bristle is seldom more than one-half as long as the hind metatarsus, and the apical anterodorsal bristle is usually shorter than the apical anteroventral bristle; *neouliginosa* has the apical dorsal at least 0.66 and usually 0.75 to 0.80 as long as the hind metatarsus, and the apical anterodorsal is usually 0.6 as long as the apical dorsal and subequal to the anteroventral bristle.

As noted under *albitarsis*, the Neotropical *serotina* has a similar dorsocentral arrangement, but the absence of hairs on pre-episternum 3 in both sexes and the area devoid of clothing setulae on the apical third of the hind femora in the females should readily distinguish *serotina* from *nasoni*.



FIGS. 67–73. Lateral view of ovipositors. 67. *Lispe sociabilis*. 68. *L. albitarsis*. 69. *L. cotidiana*. 70. *L. nasoni*. 71. *L. bohemica*. 72. *L. probohemica*. 73. *L. canadensis*.

Occasionally specimens of other species have the anterior postsutural dorsocentral bristle abnormally duplicated, but in such cases the adventitious bristle is usually long and inserted adjacent to the base of the anterior one, and other specific characters will usually indicate the identity of these aberrant specimens.

DISTRIBUTION: Two hundred and twenty-five specimens of both sexes were examined from Alabama, Alberta, Arizona, Arkansas, California, Colorado, Connecticut, Cuba, Florida, Illinois, Indiana, Iowa, Louisiana, Manitoba, Maryland, Michigan, Minnesota, Nevada, New Jersey, New York, North Carolina, Ontario, Puerto Rico, Quebec, South Dakota, Texas, Utah, Virgin Islands, Washington, Wisconsin, and Wyoming.

Lispe antennata Aldrich

Figures 1, 28, 41, 56

Lispa antennata ALDRICH, 1913, Jour. New York Ent. Soc., vol. 21, p. 144.

This species and *nudifacies* can be separated from other Nearctic *Lispe* by the largely fulvous tarsi in both sexes. The presence of rather dense grayish pruinescence may cause the hind tarsi to appear somewhat darkened, when viewed at some angles. Specimens at hand would indicate that this species is quite limited in distribution and that it is replaced in the Middle West and East by *nudifacies* which is described below. Besides the differences in shape of the superior forceps and fifth sternites of the males, the only satisfactory character which appears to distinguish these two closely allied species is the presence, in the males, of a bare central area on the parafacials in *nudifacies* and an entirely setulose corresponding portion in *antennata.*

DISTRIBUTION: Besides the type series of six males and eight females from Pyramid Lake, Nevada (not Utah), in the United States National Museum, the following specimens have been examined: Nevada: Winnemuca Lake, male and three females, July 17, 1911 (J. M. Aldrich), in the United States National Museum; Walker Lake, female, October 3, 1935 (A. J. Bassinger), in H. C. Huckett collection.

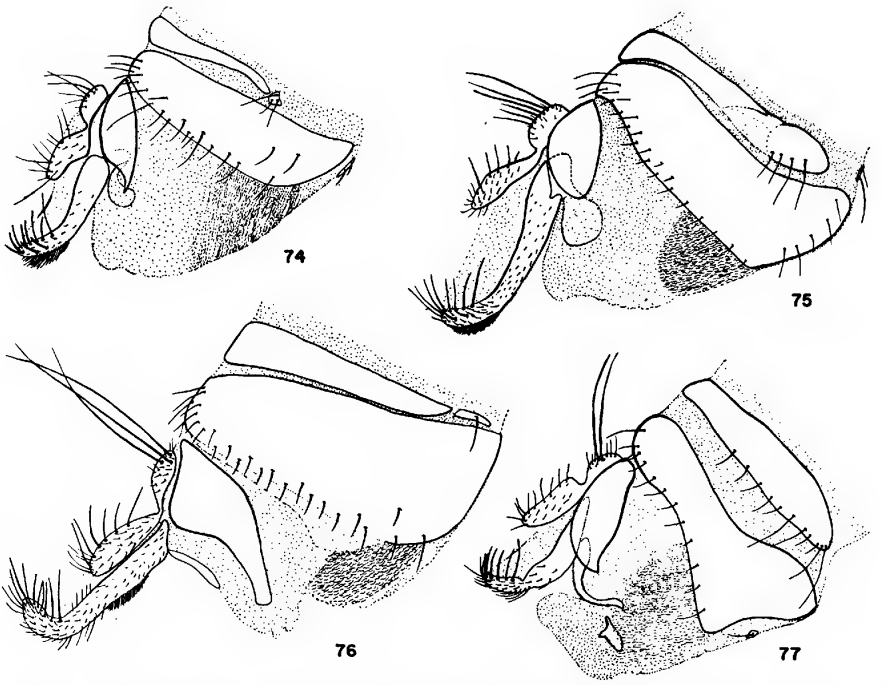
Lispe nudifacies, new species

Figures 2, 27, 38

MALE: Length, 7.0 to 7.5 mm. Head black, grayish pruinescent, the frontal vitta blackish, with a narrow yellow triangle extending to base of antennae. Parafrontals and parafacials with yellowish reflections adjacent to base of antennae. Narrowest distance between the eyes 0.45 of greatest head width. Parafacials setulose only on dorsal and ventral portions, bare in the center (fig. 2). In frontal view, each parafrontal subequal to greatest width of the facial plate or one facial ridge. With about six bristles laterad and ventrad to the vibrissae. Cheeks 0.4 of eye height. Palpi and apex of second antennal segment yellow, the remainder of the antennae black. Margins of palpi gradually divergent. Eyes bare.

Thorax black, grayish pruinescent, with five rather faint brownish vittae, the median vitta most distinct and continued onto the disc of scutellum. Dorsocentrals 2:3; prescutellar acrosticals short and slender, but distinct. Anterior mesopleural bristle absent or very short. Hypopleura and pre-episternum 3 setulose, beret usually bare.

Tibiae, tarsi, and a limited apical portion of the femora fulvous, remainder of legs infuscated. Fore femora rather stout, with a row of about six strong, subdorsal, posterodorsal bristles and a row of more numerous but shorter bristles below them; with the usual posteroventral row and an area largely devoid of clothing setulae above the latter on the apical half.



FIGS. 74–77. Lateral view of ovipositors. 74. *Lispe jamesi.* 75. *L. palposa.* 76. *L. salina.* 77. *L. sordida.*

Fore tibiae with a submedian anterodorsal and posterior bristle; only the dorsal and posteroventral apical bristles distinct. Fore tarsi subequal to the tibiae, the former not noticeably modified. Mid femora with a row of anterior, anteroventral, and posteroventral bristles on the basal half, the anterior bristle shortest, the posteroventrals longest, and these only are subequal to femoral diameter. Mid tibiae with a submedian anterodorsal and posterior bristle. Mid tarsi not abnormally modified. Hind femora with short but distinct anteroventral and posteroventral bristles in addition to the usual posterodorsal row. Hind tibiae with a submedian anteroventral, anterodorsal bristle, and with three or four longer setulae basad to the latter, and occasionally with one or two beyond. Hind tarsi not noticeably modified, subequal to length of the tibiae. The pulvilli about as long as the fifth tarsal segment on the corresponding leg.

Wings faintly brownish yellow, hyaline; third and fourth veins subparallel. Halteres fulvous; calyptrae white, the margins rather yellowish.

Abdomen subcylindrical, black, densely grayish pruinescent, and the larger bristles inserted in dark spots. With a pair of dark, subtriangular

spots on dorsum of second and third visible tergites, and a median one on the fourth; with a faint irregularly shaped mark on sides of second and third tergites.

FEMALE: Length, 7.5 to 8.0 mm. Similar to the male, but with entirely setulose parafacials. The brown thoracic vittae more distinct.

Fore tibiae with the apical dorsal, posterodorsal, and posteroventral bristle well developed. Mid femora with basal bristles reduced in length. Hind femora with only one or two anteroventral bristles on the apical half. Pulvilli short, 0.3 to 0.5 of the length of corresponding fifth tarsal segment.

Abdomen broader and more flattened, the lateral spots on second and third visible tergites and at base of the large bristles not so distinct.

TYPE MATERIAL: Holotype, male; allotype, female, mounted on the same pin and collected *in copula,* Dane County, Wisconsin, May 26, 1936 (F. M. Snyder). Paratypes: Alberta: Wabamum, male, August 2, 1936; female, September 1, 1932 (E. H. Strickland), in University of Alberta. Manitoba: Strathclair, two males, three females, July 16, 1926 (G. S. Brooks), in the American Museum of Natural History, Canadian National Collection, and H. C. Huckett collection. Michigan: Big Rapids, male, September 7, 1942 (C. W. Sabrosky), United States National Museum; Wexford County, male, August 3, 1944; Manistee County, male, August 11, 1940 (R.R. Dreisbach), in H. C. Huckett collection. Minnesota: Scott County, female, July 5, 1951 (F. M. Snyder), in F. M. Snyder collection. Wisconsin: Madison, male, May 11, two females, May 14, 1936; Dane County, four males, female, July 2, 1951 (F. M. Snyder), May 10, 1900, in F. M. Snyder collection.

Lispe polita Coquillett

Figures 26, 43

Lispe polita COQUILLETT, 1904, Invertebrata Pacifica, vol. 1, p. 34.
Lispa polita ALDRICH, 1913, Jour. New York Ent. Soc., vol. 21, p. 146.

This species and *cotidiana* are the only Nearctic species known to me with a submedian anteroventral to ventral bristle on the mid tibiae; the considerably different shape of the superior forceps of the two species (figs. 26, 23) would indicate that they are not merely color phases of the same species. In fact, the fulcrum penis and associated parts of *polita* appear identical with those of *antennata* and *nudifacies*. The subshiny black abdomen with indistinct brownish pruinescent median vitta and narrow apical transverse bands, together with the entirely infuscated legs, should further distinguish *polita* from closely related species. Several Nearctic members of the *palposa* group have entirely black legs, but the presence

of a submedian anterodorsal and posterior bristle on the fore tibiae and a median anteroventral bristle on the hind tibiae of *polita* will readily distinguish both sexes of this species from the dark-legged *palposa* group.

DISTRIBUTION: Besides the type series of male and female from Ormsby County, Nevada, July 6 (Baker), in the United States National Museum, 82 specimens of both sexes have been examined from Alberta, California, Colorado, Idaho, Nevada, South Dakota, Utah, and Wyoming. I have not verified the occurrence of this species in New Jersey (Aldrich, 1913, p. 146).

Lispe uliginosa Fallén

Figures 24, 39

Lispa uliginosa FALLÉN, 1825, Diptera Sueciae: Muscides, p. 93. KOWARZ, 1892, Wiener Ent. Zeitg., vol. 11, p. 45. BECKER, 1904, Zeitschr. Ent., Breslau, vol. 29, p. 43. KARL, 1928, Die Tierwelt Deutschlands, pt. 13, Diptera: Muscidae, vol. 3, p. 110.

Lispe uliginosa LOEW, 1847, Ent. Zeitg. Stettin, vol. 8, p. 24. SCHINER, 1862, Fauna Austriaca, vol. 1, p. 661.

This species has been recorded from North America on numerous occasions, but these records, in so far as I have been able to ascertain, have been based on specimens of *cotidiana, neouliginosa, albitarsis* (large female specimens), and damaged or rubbed specimens of *nasoni*. To date I have not seen any Nearctic specimens which are conspecific with the few Palearctic examples that were available for study.

The genitalia of four European males have been critically examined, and they exhibit slight, but apparently constant, differences from those of the very closely allied Nearctic *cotidiana* in the shape of the superior forceps and bristling of the lateral processes of the fifth abdominal sternite. The absence of a strong submedian anteroventral to ventral bristle on the mid tibiae and absence of beret hairs will also separate both sexes of *uliginosa* from *cotidiana*. All males of *uliginosa* examined also lack a distinct apical posterodorsal bristle on the fore tibiae which is present in *cotidiana*.

Lispe neouliginosa also lacks beret hairs and is not easily separated from *uliginosa* except on the basis of male genitalic characters. In males of *uliginosa*, the apical ventral to anteroventral bristle appears to be somewhat more well developed than in *neouliginosa* which either lacks this bristle or has it scarcely differentiated from the clothing setulae. The single female European specimen of *uliginosa* studied has none of the hair-like anteroventral setulae near apex of the hind femora strongly differentiated, but in all specimens of *neouliginosa* one or two of the hairs in this series appear to be more well developed than the others and are sub-

equal in length to the dorsal-ventral height of the femora where situated.

The four males examined were from Scotland and Germany, and the female was from Sweden.

Lispe cotidiana, new species

Figures 23, 42, 55, 69

MALE: Length, 6.5 to 7.0 mm. Head black, grayish pruinescent. Front black, with a narrow brownish frontal triangle extending to base of antennae. Front at vertex 0.45 of greatest head width, at narrowest point face 0.37 of head width. Parafrontals narrow, with numerous setulae laterad to the three or four pairs of strong, inwardly directed, and the two posterior, outwardly directed, pairs of bristles. Parafacials, in frontal view, as wide as width of third antennal segment. The parafacials with setulae on almost their entire length, somewhat fewer above, and those below longer. In profile, the juncture of parafacials and parafrontals as long as greatest width of third antennal segment, narrowed to 0.25 of this width below. Cheeks 0.286 of eye height. Vibrissae and inner vertical bristles strong, subequal. The outer verticals and ocellars subequal, about 0.75 of the length of inner verticals. Antennae black, second segment with a narrow apical fulvous area on inner surface. Third segment 1.5 times as long as second. Arista sparsely plumose on the basal half. Palpi yellow, the margins gradually divergent. Proboscis shiny black.

Thorax black, grayish pruinescent. The disc darker, with a median central dark vitta, another along the plane of each row of dorsocentral bristles and a fainter one along plane of posthumeral and intra-alars. Pruinescence on pleura light gray. Dorsocentrals 2:3 and with a pair of weak prescutellar acrosticals. Beret, hypopleura, and pre-episternum 3 setulose.

Legs black, extreme apices of femora and the tibiae fulvous yellow to fulvous, occasionally the fore tibiae with somewhat darker reflections on apical half or less. Fore femora with a row of strong posterodorsal and posteroventral bristles and with a narrow, bare, longitudinal area on the apical half just above the posteroventral row of bristles. Fore tibiae with a submedian anterodorsal and posterior to posteroventral, well-developed bristle, and with a well-developed apical dorsal and posteroventral bristle, the apical posterodorsal bristle distinct but shorter than the others; occasionally with the apical anteroventral bristle distinct. Fore tarsi normal, subequal to length of fore tibiae. Mid femora with a row of short, but distinct, anterior, anteroventral, and posteroventral bristles on the basal half and with the usual apical and subapical posterior bristles. Mid tibiae with a submedian, anteroventral, anterodorsal, and posterior to postero-

ventral bristle, the position of the latter variable, usually somewhat more posteroventral than posterior, but in a few specimens it may be almost posterodorsal. Mid tarsi normal. Hind femora with distinct anteroventral and posteroventral bristles on the basal half to two-thirds in addition to the usual row of anterodorsal bristles. Hind tibiae with a single prominent submedian anteroventral bristle and with a submedian anterodorsal bristle, basad and apicad of which there are several shorter but distinct bristles; posterodorsal clothing setulae on the median to apical half somewhat longer and stronger than the others. The apical dorsal, posterodorsal, and posteroventral bristles about 1.5 to 2.5 times as long as the apical anterior bristle. Hind tarsi 0.8 to 0.9 times as long as the hind tibiae. All tarsal claws and pulvilli distinct, but only about half as long as the shortest (usually the fourth) tarsal segment on the corresponding legs.

Wings normal, hyaline, the third and fourth veins subparallel at apices. Calyptrae hyaline, margins yellow, concolorous with halteres.

Abdomen subcylindrical, black, grayish pruinescent; viewed from above the dorsum almost entirely subshiny black. Viewed from above and behind with a narrow, median gray vitta on second and third visible tergites and with a narrow apical transverse band. With one or two pairs of strong median and apical lateral bristles on the second and third visible tergites, and with a complete row of apicals on the fourth as well as one or two median lateral bristles. The bristles and large setulae on the sides of the abdomen inserted in small brown spots. Basal sternite setulose.

FEMALE: Length, 6.5 to 7.5 mm. Similar to the male, the parafacials slightly wider and with setulae somewhat stronger and more numerous. The bare apical area on the fore femora above the posteroventral row of bristles more reduced. Mid femora with only about two fine hairs at base of posteroventral surface, but the anterior row of bristles similar to that in the male. Hind femora with at most one or two basal and median anteroventral bristles, but with the usual anterodorsal row. Pulvilli and claws smaller. Abdomen somewhat more lanceolate, and with more readily defined abdominal spots which are smaller and with the median and lateral bristles less well developed but inserted in the usual round, brown spots.

The mean face/head ratio in 15 males and females measured was 0.358 (0.326–0.380) and 0.422 (0.404–0.446), respectively.

TYPE MATERIAL: Holotype, male, Suffield, Alberta, Canada, September 5, 1948; allotype, female, and paratypes, seven males, eight females, same data as holotype; 14 males, 22 females, topotypical, July 15 to 31, 1949 (F. M. Snyder). Paratypes in United States National Museum,

Museum of Comparative Zoölogy at Harvard College, British Museum (Natural History), J. E. Collin collection, and F. M. Snyder collection.

DISTRIBUTION: Two hundred and eighteen males and females have also been studied from Alaska, Alberta, British Columbia, Colorado, Idaho, Illinois, Maine, Manitoba, Mexico (Districto Federal), Minnesota, North Dakota, New Brunswick, New Hampshire, New Mexico, New York, Northwest Territories, Ontario, Quebec, Saskatchewan, Utah, Washington, Wisconsin, and Yukon Territory.

Van der Wulp (1896, p. 342) described *Lispa serotina* from Mexico. There are two species present in the cotype series of *serotina* in the British Museum (Natural History). One male cotype without abdomen (Mexico City) is *L. cotidiana,* as are the specimens which van der Wulp identified as *L. uliginosa.* The other species is represented by one male from Atoyac, Veracruz, Mexico, April (H. H. Smith), which is hereby designated as the lectotype, and a female from Medellin, Veracruz, Mexico, January, 1888 (H. H. Smith). There are the same as *edwardsi* Malloch (1934, p. 278; Snyder, 1949, p. 5).

Within the type series of *cotidiana* and those under distribution, the color of the parafrontal and parafacial pruinescence varies from silvery gray to almost yellow. The dorsal abdominal spots, especially in the males, are somewhat variable in size, owing to the variation in width of the median vitta. However, I have been unable to find any structural characters which are correlated with these variations in color.

See also remarks under *Lispe uliginosa* Fallén.

Lispe neouliginosa, new species

Figures 22, 44, 58

MALE: Similar in size and color to that of *cotidiana,* but lacks hairs on the beret and the submedian anteroventral to ventral bristle on the mid tibiae. The pulvilli of all legs are subequal or longer than the length of the shortest tarsal segment of the corresponding leg. The genitalia are different from those of any other Nearctic species studied.

FEMALE: Length, 6.5 to 7 mm. Similar to the male, but with the pulvilli smaller and with the ventral bristles of the mid femora much reduced or absent; the anteroventral bristles on the hind femora are less numerous, and there are no posteroventral bristles. The ovipositor is identical with the ovipositors of the other Nearctic species of the *uliginosa* group, except *nasoni* and *albitarsis.*

The head/face ratio in the 15 males and 12 females which were measured was 0.363 in the male (0.333–0.392) and 0.430 in the female (0.388–0.470).

TYPE MATERIAL: Holotype, male, Lone Pine, Inyo County, California, May 23, 1937 (M. A. Cazier); allotype, female, Truckee, California, July 5, 1936 (A. E. Pritchard). Paratypes: Arizona: Douglas, female, August (F. H. Snow), in H. C. Huckett collection. Idaho: Moscow, male, June 29, 1932 (J. M. Aldrich), United States National Museum; Hagennan, two females, August 19, 1938 (G. F. Knowlton), Utah Agricultural Experiment Station collection. Nevada: Wells, three males, female, July 12, 1911; Winnemucca Lake, two males, July 17, 1911; Pyramid Lake, male, July 16, 1911; Walker's Lake, female, July 25, 1911; Soda Lake, near Hazen, male, July 13, 1911. New Mexico: Las Cruces, male, June 15, 1917 (all J. M. Aldrich); Sorocco, female (S. W. Williston), United States National Museum. Ontario: Lake Abitibi, Camp 33, female, July 8, 1925 (N. K. Bigelow). Saskatchewan: Saskatoon, female, May 18, 1949 (A. R. Brooks), all in Canadian National Collection. Utah: Cache County, female (J. M. Aldrich), United States National Museum; Locomotive Springs, male, August 8, 1934 (C. W. Smith), Utah Agricultural Experiment Station collection. Washington: Hanford, male, female, July 14, 1949 (J. J. Davis); Soap Lake, two males, female, July 22, 1949 (M. T. James), Washington State College collection; Ringold, male July 4, 1919 (F. W. Carlson); Lake Paha, male, June 20, 1920 (R. C. Shannon); Stratford, female, July 4, 1920 (R. C. Shannon), H. C. Huckett collection. California: Pine Crest, Tuolumne County, female, July 22, 1948 (P. J. Arnaud, Jr.), F. M. Snyder collection; Mono Lake, female, July 31, 1940 (R. H. Beamer), H. C. Huckett collection.

Lispe sordida Aldrich

Figures 5, 34, 48, 77

Lispa sordida ALDRICH, 1913, Jour. New York Ent. Soc., vol. 21, p. 132.

This species is unique in the Nearctic *palposa* group in having a median posterior bristle on the fore tibiae, a submedian anteroventral bristle on the hind tibiae, and two submedian posterior to posterodorsal bristles on the mid tibiae. The margins of the palpi are more gradually divergent than in most species of this group. However, the general configuration of the male terminalia and the presence of a median white spot on the otherwise black apical hypopygial segment indicate its closer relationship to the *palposa* group than to the *uliginosa* group. The males are easily separated from those of other Nearctic *Lispe* by the very short second mid tarsal segment which is not so long as the third.

DISTRIBUTION: In addition to the type series from Brigham, Utah,

July 4, 1911 (J. M. Aldrich), in the United States National Museum, the following specimens were studied: California: Lake Elsinore, male, August 2, 1911, in H. C. Huckett collection; San Joaquin River, Newman, two females, June 16 (J. M. Aldrich), in United States National Museum. Colorado: Fort Collins, three females, August 10, 1937, in F. M. Snyder collection. New Mexico: Twenty-five miles west of Tularosa, female, July 1, 1940 (D. E. Hardy), in H. C. Huckett collection. Utah: Ephraim, male, June 1, 1937 (G. F. Knowlton), in Utah Agricultural Experiment Station collection. Washington: Lake Paha, female, September 20, 1920 (R. C. Shannon), in H. C. Huckett collection.

Lispe bohemica Becker

Figure 8

Lispa bohemica BECKER, 1904, Zeitschr. Ent., Breslau, vol. 29, p. 53. SPEISER, 1914, Zool. Anz., vol. 44, p. 93. KARL, 1928, Die Tierwelt Deutschlands, Diptera: Muscidae, vol. 3, p. 106.

Males of this species lack vibrissae and have a considerably modified fourth mid tarsal segment. The only other Nearctic species with a long, spinular process on this segment are *probohemica* and *argentea.* The different shape of the tarsal segments, as shown in figures 7 and 8, should separate these two from *bohemica.* In addition, the palpi are black in *bohemica,* and the apical four hind tarsal segments are at least 1.75 times as long as the hind metatarsus; in the other two species, the palpi are yellow to fulvous, and the last four hind tarsal segments are at most 1.25 times as long as the metatarsus. The fifth hind tarsal segment of *bohemica* bears a median apical hair which is almost as long as the length of the fourth and fifth hind tarsal segments and is more prominent than in most other Nearctic *Lispe.*

The palpi are also black in *palposa,* but the absence of a transverse band in *bohemica* should readily separate both sexes of that species from those of *palposa.* The females of *canadensis* sometimes have the palpi brownish, and some females of *bohemica* have some of the basal anteroventral setulae on hind femora almost as long as the greatest femoral diameter. Such specimens of *canadensis,* like others of that species, have the palpi slightly less abruptly dilated than those of *bohemica,* and the parafacial hairs are coarser and placed in several irregular rows on the upper half, while in *bohemica* these hairs are finer and are in one to three rows. The face, including parafacials, is brown or occasionally grayish brown in *canadensis,* and in *bohemica* it is silvery gray to grayish yellow. The face/head ratio is not significantly different in the

two species. The thoracic and abdominal spiracles are somewhat larger and more prominent in the females of *canadensis* than in *bohemica.*

Dr. W. Hennig of the Deutsches Entomologisches Institut informs me that the hind tarsi are missing in the presumed type of *bohemica,* but that the mid tarsi are present and similar to the tarsus illustrated herein.

DISTRIBUTION: Quebec: Great Whale River, male, three females, August 24, 28, 1949, in Canadian National Collection. Northwest Territories: Chesterfield, four females, July 2, 9, 1950 (J. R. Vockeroth), in Canadian National Collection; Aklavik, male, July 18, 1932 (Bryant lot no. 305), in United States National Museum.

Lispe probohemica Speiser

Figures 7, 46, 59, 72

Lispa spinipes ALDRICH (*nec* Bigot, 1885[1]), 1913, Jour. New York Ent. Soc., vol. 21, p. 136.

Lispa probohemica SPEISER, 1914, Zool. Anz., vol. 44, p. 43.

The males of *bohemica, argentea,* and *probohemica* differ from all other Nearctic *Lispe* in having a long, apical, spine-like projection on the fourth mid tarsal segment (figs. 7, 8). The vibrissae are usually undifferentiated in *probohemica* and *bohemica,* but, if distinguishable, they are not longer than the greatest width of the palpi, while the vibrissae in *argentea* are prominent and well developed. Females of all three species lack the characteristic mid tarsal armature of the male, and the vibrissae are present. The posteroventral bristles on the basal portion of the hind femora are somewhat shorter and less numerous than in the males. See also remarks under *bohemica* and *argentea.*

DISTRIBUTION: Besides the two males and female cotypes of *L. spinipes* Aldrich from Lake Elsinore, California, and Lewiston, Idaho, in the United States National Museum, the following specimens have been studied: Arizona: Tempe, one male, July 19–21, 1917. Mississippi: Pass Christian, three males, six females, June 8, 1917. Texas: Galveston, two males, June 10, 1917 (all J. M. Aldrich), in United States National Museum and F. M. Snyder collection. Washington: Stratford, male, July 4, 1920; Ritzville, female, August 25, 1920 (R. C. Shannon), in H. C. Huckett collection.

Lispe argentea, new species

Figures 35, 45, 60

MALE: Very similar to that of *probohemica* Speiser in size and general

[1] Van Emden (1951, p. 468) has recently clarified "*Lispa*" *spinipes* Bigot.

habitus. The vibrissae are 1.25 to 1.75 times as long as the greatest width of the palpi and frequently as long as the arista or the third antennal segment. The entire face is silvery gray pruinescent. The face/head ratio is 0.351 in *argentea* ($n = 7$, range: 0.338–0.362) and in *probohemica* it is 0.305 ($n = 9$, range: 0.293–0.318). Statistically this difference is significant beyond the 0.01 level. There is a prominent, deep brown to black lateral apical band on the second to fourth visible abdominal tergites which begins on the dorsum, slightly above the declivitous portion, and extends ventrally onto the sides and the beginning of the ventral surface. The apical incision of the fifth abdominal sternite is more shallow in *argentea* than in *probohemica*. The fulcrum penis of the two species (figs. 59, 60) are also different.

FEMALE: I have been unable to find any characters, including those of the ovipositor, which would clearly distinguish female specimens taken at the same time and place as typical male specimens of the two species. The large range in the face/head ratio, 0.333 to 0.388, of nine female specimens studied suggests that a longer series would reveal that two rather close face/head averages are involved.

TYPE MATERIAL: Holotype, male, San Joaquin River, Newman, California, August 16 (J. M. Aldrich), in the United States National Museum. Paratypes: Seven males, same data as holotype, in the United States National Museum, the American Museum of Natural History, and F. M. Snyder collection; one male, Stockton, California, August 19, 1919 (E. P. Van Duzee), in Museum of Comparative Zoölogy at Harvard College.

This species might be considered to be a geographic subspecies of *probohemica* by some workers, especially since the mid tarsi are so similar in both. Until the male terminalia were studied, I had thought this to be the case, but since there are differences in these organs and a significantly different male face/head ratio between the two, I have considered the above specimens to represent a distinct species.

Lispe salina Aldrich

Figures 33, 52, 64, 76

?*Lispa cinifera* BECKER, 1904, Zeitschr. Ent., Breslau, vol. 29, p. 41.
Lispa salina ALDRICH, 1913, Jour. New York Ent. Soc., vol. 21, p. 134.
Lispa cinifera STEIN, 1920, Arch. Naturgesch., div. A, vol. 84 (1918), p. 61.

The name *salina* Aldrich is used for this species until the characters mentioned by Aldrich to distinguish it from the Central Asiatic *cinifera* can be evaluated by an examination of Becker's type or other authentic Asiatic specimens.

The males of *salina* are easily distinguished from those of other Nearctic species by having very long, fine hairs on the apical margin of the fifth abdominal sternite and by the very long, numerous posteroventral bristles on the basal half of the hind femora.

Females are less easily separated from those of closely allied species, and the key characters appear to be more constant than any others found. The comparatively large face/head ratio is quite characteristic of this species, but the figures should be obtained by actual measurement and not by casual inspection. The anterior portion of the parafrontals are dark brown and contrast rather sharply with the grayish parafacials and the posterior part of the parafrontals in both sexes. This darkened area is, strictly speaking, not the transverse band of other species, but a darkened anterior area of the parafrontals which (frontal view) in most specimens does not extend appreciably below the insertions of the strong anterior parafrontal bristles.

Large specimens of this species are considerably bigger than any other Nearctic *Lispe,* and in such cases identification can almost be made on this basis. However, there was considerable variation in size of the specimens studied.

DISTRIBUTION: Besides the type series from Utah, Nevada, and California in the United States National Museum, 115 specimens of both sexes were studied from Alberta, California, Colorado, Manitoba, Nebraska, Nevada, Northwest Territories, Oregon, Saskatchewan, Utah, and Washington.

Lispe canadensis, new species

Figures 17, 19, 47, 62, 73

MALE: Length, 5.75 to 6.25 mm. Head black, silvery gray pruinescent, the front sometimes brownish to yellowish gray pruinescent. Frontal triangle extends to base of antennae. The transverse band reaching from between the first and second anterior parafrontal bristles to about opposite middle of second antennal segment. Parafacials with several irregular rows of moderately long, fiine hairs along their entire length. Palpi yellowish brown to almost black, grayish pruinescent; moderately dilated. Antennae entirely black. Eyes bare.

Thorax black, brownish gray pruinescent, and with a faint indication of a median brown stripe and four darker lateral vittae. Clothing setulae and bristles rather long. Anterior (mesothoracic) spiracle very large, the sclerotized ridge surrounding it appearing much reduced because of the large flap-like covering of hairs (fig. 17). Posterior spiracle (metathoracic) with distinct black setulae among the posterior flap-like covering

of hairs, several of the more dorsal setulae longer than the flap. Preepisternum 3 only setulose. Anterior mesopleural bristle absent or scarcely differentiated.

Legs entirely black. Fore femora with a row of subdorsal and another row of more ventrally situated posterodorsal bristles. The posteroventral surface without distinct bristles, but with numerous moderately long hairs. Fore tibiae without median bristles. Fore tarsi subequal to length of the tibiae, the former not unusually modified. Mid femora with numerous, fine, anterior, and ventral bristle-like hairs on the basal half. Mid tibiae with a submedian anterodorsal and a posterior to posterodorsal bristle. Mid tarsi about 0.8 as long as the tibiae, not modified. Hind femora rather slender and slightly bowed (fig. 19), with a complete row of long anterodorsal and less numerous anteroventral bristles. Mid tibiae with a submedian anterodorsal bristle, the clothing setulae on the same surface rather long, fine, and upright. Hind tarsi 0.72 to 0.87 times as long as the tibiae, the apical four segments somewhat narrower than the metatarsus, the second to fourth segments inclusive as long as the metatarsus. All pulvilli small, about as long as the greatest width of the fifth tarsal segment on the corresponding legs.

Wings hyaline, indistinctly darkened near base. Third and forth veins parallel apically. Calyptrae white, margins pale yellow. Halteres infuscated.

Abdomen black, grayish pruinescent, and with a pair of dark brown to blackish spots on the lateral apical portion of the second to fourth visible tergites. With a moderately distinct dark median vitta on at least the first and second and frequently on the third tergites. The larger bristles usually inserted in small dark spots. The large apical hypopygial segment velvety black and with a silvery white median dorsal spot. The abdominal spiracles distinctly enlarged and very hairy; the hairs light brown to yellow, especially at tips, and as a consequence, the center of the spiracles appear lighter colored than the periphery. Basal sternite hairy, the second with numerous long bristles.

FEMALE: Length, 6.0 to 7.0 mm. Similar to the male, the pruinescence on face frequently more yellowish and the transverse band frequently less distinct. The parafacial hairs slightly longer, but more numerous. Thorax brownish pruinescent, the lateral vittae more distinct and the median one less distinct. Posteroventral surface of fore femora with a row of distinct bristles. All tarsi subequal in length to the tibiae. The pulvilli smaller.

TYPE MATERIAL: Holotype, male, Chesterfield, Northwest Territories, Canada, June 5, 1950; allotype, female, topotypical, July 13, 1950. Paratypes, topotypical: female, June 26; six males, six females, July 2; three

males, July 3; male and female, July 4; male, July 12; female, July 13; all 1950 (all J. R. Vockeroth or J. G. Chilcott). Manitoba: Churchill, three males, June 4, 1947 (B. Hocking), June 6, 1947 (R. W. Fisher), August 27, 1950 (J. R. Vockeroth); female, June 17, 1947 (T. N. Freeman). Holotype, allotype, and the 23 paratypes in Canadian National Collection. Northwest Territories: Aklavik, four males, June 25, 1930, July 27, 1932, September 12, 1929, September 20, 1931; female, July 18, 1932 (all O. Bryant), in United States National Museum.

There is considerable intergradation in the color of the palpi and the dorsoventral length of the transverse band in the females in the above series of specimens. Because of this, it is sometimes difficult to separate some individual females from those of *bohemica.* As discussed more fully under that species, the degree of hairiness of the parafacials will be useful in separating aberrant specimens of the two species. There are three males and one female in the paratype series which have two posterodorsal bristles on the mid tibiae, and there is one male and one female which have one posterodorsal bristle on one tibia and two such bristles on the other.

The metathoracic spiracle in both sexes of *canadensis,* especially in the females, is larger than in most related species and is distinctly larger than the knob of the halteres. The black setulae among the fulvous to golden flap-like covering of hairs are also longer and much more prominent than in *bohemica,* which has these setulae present but scarcely longer than the flap-like covering of hairs.

See also notes under *johnsoni* Aldrich.

Lispe johnsoni Aldrich

Figures 18, 20

Lispa johnsoni ALDRICH, 1913, Jour. New York Ent. Soc., vol. 21, p. 138.

This species, which is known to me from females only, is quite similar to *canadensis,* new species. Females of *johnsoni* may be separated by the smaller size of the anterior thoracic spiracle. In that species, the spiracle, especially on the lower half, is surrounded by a prominent sclerotized area, while in *canadensis* it is so large and covered with so many fine hairs that the sclerotized area is practically obscured. The posterior thoracic spiracle in *johnsoni* lacks prominent, long, black setulae among the flap-like covering of hairs along the posterior margin. As seen in figures 19 and 20, the hind femora are more slender and bowed in *canadensis* than in *johnsoni.* The palpi in both species are fulvous to dark brown, but, when viewed at certain angles, they may appear almost black. In frontal view, there is a narrow but distinct transverse band which extends

ventrally to opposite about the basal third of the second antennal segment. The face/head ratio means of the females of *canadensis* and *johnsoni* are not significantly different (*johnsoni:* mean, 0.453; range, 0.435–0.470; $n = 6$; *canadensis:* mean, 0.461; range, 0.442–0.479; $n = 13$).

Male specimens of *canadensis* were kindly compared with the male cotype of *johnsoni* in the Museum of Comparative Zoölogy at Harvard College by Dr. L. E. Chadwick, who informed me that the differences in the mesothoracic spiracle and hind femora hold true in this sex also.

DISTRIBUTION: Massachussetts: Cohasset, four females, September 9 (two of these are cotypes); female, September 8 (all C. W. Johnson), in the Museum of Comparative Zoölogy at Harvard College and the United States National Museum. New York: Long Beach, Long Island, female, December 23 (*sic!*), 1923 (C. W. Johnson), in the Museum of Comparative Zoölogy at Harvard College.

Lispe palposa (Walker)

Figures 31, 49, 63, 75

Anthomyia palposa WALKER, 1849, List of dipterous insects in the British Museum, vol. 4, p. 926. STEIN, 1901, Zeitschr. Hymenoptera u. Diptera, vol. 1, p. 203. HUCKETT, 1934, Canadian Ent., vol. 66, p. 138.

Anthomyia similima WALKER, 1849, *op. cit.*, vol. 4, p. 972. STEIN, 1901, *ibid.*, vol. 1, p. 209. HUCKETT, 1934, *ibid.*, vol. 66, p. 139.

Lispa nigromaculata STEIN, 1897, Berliner Ent. Zeitschr., vol. 42, p. 278.

Lispa palposa ALDRICH, 1913, Jour. New York Ent. Soc., vol. 21, p. 133.

Both sexes of this species and *jamesi* appear to be closely allied on the basis of the prominent dark transverse band, similarly shaped palpi, and a comparatively large head/face ratio. Except for differences in the hind tarsi of the males, the legs are similarly shaped and bristled in the two species. The palpi are black in *palposa,* although in a few specimens they appear deep brownish black; in *jamesi* the palpi are yellow to fulvous brown. Aside from small differences in the ovipositors, this difference in color of the palpi appears to be the only satisfactory means of separating females of the two species.

The only other North American species of *Lispe* with black palpi is *bohemica,* and the males can be separated from those of *palposa* by the modified fourth mid tarsal segment in *bohemica.* Besides the characters mentioned in the key, females of *palposa* can be distinguished from those of *bohemica* by the somewhat larger size of the abdominal spiracles in *bohemica* and the darker color of the flap-like covering of hairs of both thoracic spiracles in *palposa.*

In most specimens of *palposa,* the transverse band (frontal view) extends ventrally to opposite the apex of the second antennal segment,

while in other species with a distinct frontal band it seldom extends below the middle of the second antennal segment.

DISTRIBUTION: Slightly over 100 specimens of both sexes, including cotypes of *nigromaculata* Stein in the United States National Museum, were examined from Alberta, British Columbia, Idaho, Iowa, Kansas, Manitoba, Maryland, Michigan, Minnesota, Nevada, New Jersey, New York, Ontario, Oregon, Pennsylvania, Quebec, Saskatchewan, South Dakota, Utah, Washington, and Wisconsin.

Lispe brevipes Aldrich

Figures 15, 32, 50, 65

Lispa brevipes ALDRICH, 1913, Jour. New York Ent. Soc., vol. 21, p. 137.

In the United States National Museum collection there is a single male specimen with the same date and locality data mentioned by Aldrich in his description of this species. It agrees with his description and bears a label "*Lispa brevipes* Ald." in his handwriting, but there is no type label on this specimen. I feel confident that this is actually the unique type. However, since there is a closely allied species, *jamesi,* described as new below, it is thought desirable to designate the above specimen as the neotype of *brevipes,* although it might be argued that the name lectotype would be preferable.

For a further discussion of characters of this species, see notes following the description of *jamesi.*

DISTRIBUTION: California: Lakeside, Tahoe, four males, June 19, 1927 (J. M. Aldrich), in United States National Museum. Colorado: Cuchara, male, August 7, 1940 (F. M. Snyder), in F. M. Snyder collection. Indiana: Lafayette, three males, female, July 15, 17 (J. M. Aldrich), in United States National Museum. Manitoba: Aweme, female, June 18, 1930 (H. A. Roberts), H. C. Huckett collection. Washington: Dragon Creek, male, June 21, 1930 (J. M. Aldrich), in United States National Museum; Virdin, female, July 5, 1932 (Martin), in H. C. Huckett collection. Wisconsin: Madison, two females, May 9, 1936 (F. M. Snyder), in F. M. Snyder collection.

Lispe jamesi, new species

Figures 16, 30, 66, 74

MALE: Length, 6.0 to 7.0 mm. Head black, the front, parafacials, and back of head silvery gray pruinescent; the face, facial ridges, and cheeks yellowish pruinescent. Transverse band velvety brownish black and, in front view, extending from base of subapical strong parafrontal bristle to opposite middle of the second antennal segment. Frontal triangle extends

to base of the antennae. Parafrontals with numerous accessory hairs and setulae laterad to the row of parafrontal bristles. Parafacials as wide as width of third antennal segment, with a few hairs on the lower third only. Vibrissae very short and hair-like, scarcely differentiated. Antennae black. Palpi yellow, the margins distinctly divergent and at widest part as wide as length of the somewhat short third antennal segment. Eyes bare.

Thorax black, grayish pruinescent, with a very faint median brown line and indications of four darker gray vittae. Prescutellar acrosticals very slender but distinct; dorsocentrals 2:3, subequal; anterior mesopleural bristle not differentiated; hypopleura setulose only on pre-episternum 3. Anterior spiracle (mesothoracic) small, the opening slender. Posterior spiracle (metathoracic) smaller than knob of halteres and without well-defined setulae among the flap-like covering of hairs.

Legs black. Fore femora with the normal row of bristles. Fore tibiae without a median bristle. Mid femora slender and somewhat narrowed on the apical half, with the anterior, anteroventral, and ventral setulae fine, scarcely differentiated. Mid tibiae normally with a single submedian anterodorsal and posterodorsal bristle in addition to the usual apicals. Hind femora with about seven long, anteroventral bristles on the apical half, and with a few fine, short hairs on the basal half which are not so long as the diameter of femora where situated; with some slightly longer posteroventral ones on basal half. Hind tibiae with a submedian anterodorsal bristle, and the clothing setulae somewhat elongated. Hind tarsi 0.6–0.7 times as long as the hind tibiae. Fifth tarsal segment with distinct subapical posterior bristles as in figure 16; other tarsi not noticeably modified.

Wings hyaline. Third and fourth veins subparallel apically. Calyptrae white, the margins faintly yellow. Halteres yellowish brown.

Abdomen black, grayish pruinescent, with faint lateral subtriangular dark marks on second and third visible tergites and with dense yellowish brown pruinescence on dorsum of the fourth tergite and frequently with indications of this colored pruinescence on the declivitous portion of the others. Spiracles small, not larger than diameter of stalk of halteres. The large apical hypopygial tergite velvety black, and with a silvery white median spot. Basal sternite hairy, the fifth moderately cleft in the middle, without unusually long marginal bristles.

FEMALE: Length, 6.75 to 8.0 mm. Similar to the male, but the pruinescence, especially on the frons, more yellowish gray. Parafacials sparsely setulose to the upper margin. The thoracic vittae broader and more distinct. The anterior mesopleural bristle frequently differentiated, but short. Hind femora without posteroventral setulae on the basal half. Hind tarsi

subequal to length of the hind tibiae, the fifth segment without the distinct long, subapical, posterior bristles. The wings more yellowish to brownish hyaline, especially on the basal half adjacent to the longitudinal veins. Abdomen with a median dorsocentral dark vitta. The fourth visible tergite somewhat fulvous to brown at base. The subtriangular marks on third tergite brownish.

TYPE MATERIAL: Holotype, male, Neskowin, Oregon, August 10–17, 1948 (M. T. James); allotype, female, same data as holotype, type and allotype no. 171 in Washington State College collection. Paratypes: Four males and three females, same data as type. Washington: Ocean Park, seven males and five females, August 11–12, 1950 (M. T. James). California: Santa Cruz, female, June 15–17, 1950 (M. T. James). With the kind permission of Dr. James, the 13 paratypes are distributed in the American Museum of Natural History, Museum of Comparative Zoölogy at Harvard College, United States National Museum, and the Washington State College, and F. M. Snyder collections. Alaska: Anchorage, male, July 20, 1921 (J. M. Aldrich), in United States National Museum.

This species is quite similar to *brevipes* Aldrich, but the longer and stronger subapical posterior bristles on the larger fifth hind tarsal segment in the male, as well as the greater head/face ratio in both sexes, should readily separate the two species. In *brevipes,* this ratio in the male is 0.339 (0.346 in neotype, and the range is 0.325–0.349 in 10 measured); in *jamesi* the mean ratio is 0.383 (holotype: 0.378 and the range is 0.362–0.408 in the 14 measured). The corresponding mean ratio in females of *brevipes* is 0.399 (range in six is 0.384–0.415), and in *jamesi* it is 0.451 (range in eight is 0.434–0.460).

Most male specimens of *jamesi* have distinct yellowish to brownish pruinescence on at least the fourth visible tergite and frequently on the sides of the others; in *brevipes* this pruinescence is gray, except in one male from Indiana, which has the first four visible tergites almost entirely yellowish brown pruinescent. I have dissected the terminalia of this specimen and can find no characters, either in the terminalia or externally, that would distinguish it from others taken at the same time in the same locality.

Lispe tentaculata (DeGeer)

Figures 4, 9, 10

Musca tentaculata DEGEER, 1776, Memoires pour servir à l'histoire des insectes, vol. 6, p. 86.

Eriphia acela WALKER, 1849, List of dipterous insects in the British Museum, vol. 4, p. 963. HUCKETT, 1934, Canadian Ent., vol. 66, p. 133.

Lispe tentaculata LATREILLE, 1809, Generes crustacés et insectes, vol. 4, p. 347. SCHINER, 1862, Fauna Austriaca, vol. 1, p. 660.

Lispa tentaculata KOWARZ, 1892, Wiener Ent. Zeitg., vol. 11, p. 38. STEIN, 1897, Berliner Ent. Zeitg., vol. 42, p. 281. PANDELLÉ, 1899, Rev. Ent. France, vol. 18, p. 137. BECKER, 1904, Zeitschr. Ent., Breslau, vol. 29, p. 26. ALDRICH, 1913, Jour. New York Ent. Soc., vol. 21, p. 139. SÉGUY, 1923, Faune de France, Diptera: Anthomyides, vol. 6, p. 191. KARL, 1938, Die Tierwelt Deutschlands, pt. 13, Diptera: Muscidae, vol. 3, p. 109.

Three species, *tentaculata, sociabilis,* and *patellata,* form a species group which can be distinguished from other North American *Lispe* by the characters mentioned in the first part of this paper.

The males of these three species are readily separated by the size and structure of the first and second fore tarsal segments and by the shape of the palpi. Females are practically impossible to distinguish from one another, and the characters used in the key are far from invariable. Caution must therefore be used in naming specimens of this sex; however, the key characters are the only ones that I have found which will distinguish most female specimens.

Considerable variation in tibial color of both sexes exists in *tentaculata,* and it is believed that early references to the occurrence of the European species, *consanguinea* Loew (1858, p. 8), were misidentifications of the form of *tentaculata* with fulvous tibiae. In 1897, Stein noted that all North American male specimens of *tentaculata,* whether with light- or dark-colored tibiae, had several well-developed anteroventral bristles on the hind femora, as are present on European specimens, but in *consanguinea* males the hind femora have no distinct anteroventral bristles; the present study has confirmed this.

Considerable variation exists in the extent of the fulvous coloring of the fore tarsi, length of the clothing setulae on the anterodorsal and ventral surfaces of the hind tibiae, and the number (one to three) of anterodorsal bristles as well as the presence or absence of a short posterodorsal and anteroventral bristle on the hind tibiae. So much variation is found in the color and the number of bristles on one leg or the other of the hind pair of individual specimens that one is forced to conclude that these are actual structural variations and not manifestations of specific or subspecific differences. The variation in leg color is often associated with geographic distribution, but since so much variation exists it seems probable that the temperature of the larval or pupal media at a critical period of development, coupled with genetic factors, may acount for this variation.

The figures of the superior forceps given by Schnabl and Dziedzicki and Séguy appear somewhat different from these organs in North American and European specimens which I have had an opportunity to examine.

DISTRIBUTION: *Tentaculata* appears to be the most abundant and widespread species of *Lispe* in North America and can usually be found where there is running fresh water. It appears to be less common than *albitarsis* in the extreme southeastern part of the United States. Several hundred specimens of both sexes from Alaska and Hudson Bay to Guatemala and from California to Maryland were studied.

Lispe patellata Aldrich

Figures 3, 11, 12

Lispa patellata ALDRICH, 1913, Jour. New York Ent. Soc., vol. 21, p. 140.

Males of the *tentaculata* group exhibit an interesting series of intergradations in several structural characters. In *tentaculata,* the palpi are the least broadened of those of the three species, the second fore tarsal segment is the longest and the most curved, and the fore metatarsal prolongation is the longest. In *sociabilis,* the palpi of the males are intermediate in width between those of *tentaculata* and of *patellata,* and the prolongation of the fore metatarsus is scarcely distinguishable. In *patellata,* the palpi are the most broadened and are at least as wide as the length of the antennae, and the apical prolongation of the fore metatarsus is prominent and is somewhat more than half as long as the metatarsus.

The females of *patellata,* in so far as I have been able to associate them with the males on the basis of locality labels and personal observation while collecting, have the tibiae entirely infuscated and the posterior ones frequently have the submedian posterodorsal bristles absent or much more reduced than in *sociabilis.* The anteroventral bristles on the hind femora are usually absent, or, if a few are present, they are less numerous than in the form of *tentaculata* that has dark tibiae. (See also table 2.)

DISTRIBUTION: This species appears to be limited to the western part of the United States. Besides the type series of seven males from Idaho and Colorado in the United States National Museum, the following specimens have been examined: Colorado: Cuchara, four males, two females, August 7, 1940 (F. M. Snyder); Lake City, male, two females, August 21, 1938; Pingree Park, female, August 20, 1935; Waldon, male, September 1–3, 1938 (all C. L. Fluke), in F. M. Snyder collection; Fort Collins, male, August 9, 1936 (G. A. Hinkle), in H. C. Huckett collection. Idaho: Mt. Moscow, male, July 23, 1927 (J. M. Aldrich), in H. C. Huckett collection. Montana: Bozeman, female, September 4, 1913, in H. C. Huckett collection. New Mexico: Red River, six males, two females, August 14, 1940 (F. M. Snyder), in F. M. Snyder collection. Utah: Hole-in-Rock Canyon, Uinta Mountains, male, August 16–19, 1940 (D. G. Hall), in United States National Museum; Eureka, male,

female, May 23, 1947; Sardine Canyon, female, June 3, 1937; Logan Canyon, male, July 25, 1938; Holiday, female, July 16, 1937 (all G. F. Knowlton), in the Utah Agricultural Experiment Station collection. Washington: Mt. Ranier, Shadow Lake, male, female, July 24–25, 1932, in H. C. Huckett collection. Wyoming: Centennial, male, August 20, 1936 (C. L. Fluke), in F. M. Snyder collection.

Lispe sociabilis Loew

Figures 13, 14, 21, 36, 53, 67

Lispe sociabilis LOEW, 1861, Berliner Ent. Zeitschr., vol. 6, p. 217.
Lispa sociabilis ALDRICH, 1913, Jour. New York Ent. Soc., vol. 21, p. 145.

The absence of a distinct fore metatarsal prolongation will separate the males of this species from others in the *tentaculata* group. Specimens of both sexes frequently have the tibiae with a limited fulvous area near the base and apex, but the dark color is by far the most predominant. Many females have a distinct submedian posterodorsal bristle on the hind tibiae; this bristle is usually as long as the tibial diameter.

Numerous dissections of terminalia of both sexes of the three Nearctic species in the *tentaculata* group indicated that there are no striking or constant differences in the three species. The figures, while drawn from specimens of *sociabilis,* might serve equally well for *patellata* and Nearctic specimens of *tentaculata.*

A series of head/face ratios was made of both sexes of the three species in this group, and the summary of these measurements (table 2) may be of interest.

TABLE 2

DATA OF FACE/HEAD RATIOS IN THE *Lispe tentaculata* GROUP

Sex and Species	Number Measured	Mean	Face/Head Ratio Minimum	Face/Head Ratio Maximum
MALES				
sociabilis	22	*0.356*	0.341	0.381
tentaculata	54	*0.364*		
Light tibiae	27	*0.360*	0.337	0.384
Dark tibiae	27	*0.367*	0.337	0.397
patellata	10	*0.375*	0.349	0.400
FEMALES				
sociabilis	16	*0.407*	0.396	0.425
tentaculata	29	*0.419*		
Light tibiae	17	*0.417*	0.385	0.455
Dark tibiae	12	*0.421*	0.405	0.440
patellata	11	*0.435*	0.421	0.456

It will be seen that the mean ratios of the females are the least in *sociabilis* and greatest in *patellata,* while *tentaculata* is intermediate between the two in both sexes. A statistical analysis (*t* test) of these data indicates that the mean differences are significant beyond the 0.01 level of significance for females of *patellata* and *sociabilis,* but the differences between *tentaculata* and the other two are not significant.

DISTRIBUTION: I have not seen male specimens of *sociabilis* west of Oklahoma and Arkansas. It is usually found in the east and middle West in company with *tentaculata* deGeer. Slightly over 125 specimens of both sexes were studied from Connecticut, District of Columbia, Georgia, Illinois, Indiana, Maryland, New Hampshire, New Jersey, Mississippi, New York, Ontario, Pennsylvania, Quebec, Virginia, Wisconsin, Arkansas (Petit Jean State Park and Washington County), and Oklahoma (Latimer County).

LITERATURE CITED

ALDRICH, J. M.
1913. The North American species of *Lispa* (Diptera: Anthomyidae). Jour. New York Ent. Soc., vol. 21, pp. 126–146.

CUTHBERTSON, ALEXANDER
1937. Biological notes on some Diptera of southern Rhodesia. Trans. Rhodesia Sci. Assoc., vol. 35, pp. 16–34.

EMDEN, F. I. VAN
1941. Keys to the Muscidae of the Ethiopian region: Scatophaginae, Anthomyiinae, Lispinae, Fanniinae. Bull. Ent. Res., vol. 32, pp. 251–275.
1951. Muscidae C.—Scatophaginae, Anthomyiinae, Lispinae, Fanniinae and Phaoniinae. *In* Ruwenzori Expedition 1934–5. London, British Museum (Natural History), vol. 2, no. 6, pp. 325–710.

FERRIS, G. F.
1950. *Chapter 5 in* Demerec, M. (ed.), Biology of Drosophila. New York, John Wiley and Sons, Inc.

JOHANNSEN, O. A.
1935. Aquatic Diptera, Part II, Orthorrhapha-Bracycera and Cyclorrhapha. Cornell Univ. Agr. Exp. Sta. Mem., no. 177, pp. 1–62.

LAMBORN, W. A.
1920. The habits of a dipteron predaceous on mosquitoes in Nyassaland. Bull. Ent. Res., vol. 11, pp. 279–281.

LOEW, H.
1858. Zehn neue Diptern. Wiener Ent. Monatsschr., vol. 2, pp. 7–15.

MALLOCH, J. R.
1934. Muscidae. *In* Diptera of Patagonia and south Chile. London, pt. 7, fasc. 2, pp. 171–346.

SCHNABL, J., AND DZIEDZICKI, H.
1911. Die Anthomyiden. Nova Acta Abhandl. Leopoldinisch-Carolinischen Deutschen Akad. Naturf., vol. 95, pp. 55–358, pls. 3–37.

SÉGUY, E.
1923. Diptères anthomyides. *In* Faune de France. Paris, vol. 6, pp. 1–390.
1937. Fam. Muscidae. *In* Wytsman, P., Genera insectorum. Bruxelles, fasc. 205, pp. 1–604, pls. 1–9.
SNYDER, F. M.
1949. New genera and species of Lispinae. Amer. Mus. Novitates, no. 1403, pp. 1–9.
STRICKLAND, E. H.
1946. An annotated list of Diptera (flies) of Alberta, Additions and corrections. Canadian Jour. Res., ser. D, vol. 24, pp. 157–173.
VAN DER WULP, F. M.
1896. Biologia Centrali-Americana, Diptera, Anthomyinae. London, vol. 2, pt. C, pp. 314–346.